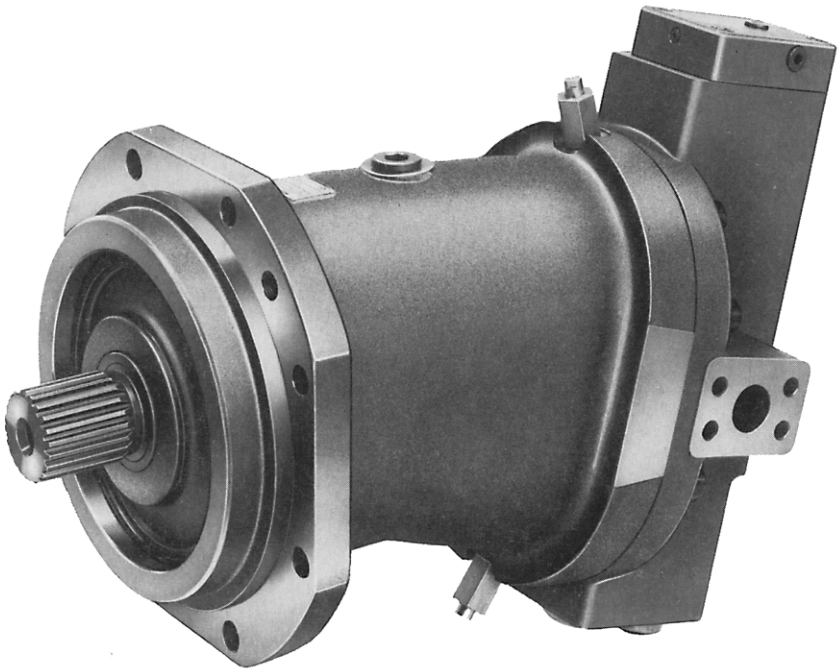
MANNESMANN REXROTH	Variable Displacement Pump A7V	RE 92210/01.84
Brueninghaus Hydromatik	Series 5.1, for open circuits Axial piston unit, bent axis design	replaces 01.82
	Sizes 250...1000	High pressure range up to 400 bar



Description

Variable displacement pump,, axial piston bent axis design, for hydrostatic transmissions in open circuits.

The flow is proportional to the drive speed and the displacement and is steplessly variable at constant drive speed.

Comprehensive programme of control devices for every control and regulating function.

Special Features of Series 5.1

New, simplified high performance rotary group with enhanced technical data and well-proven spherical control area.

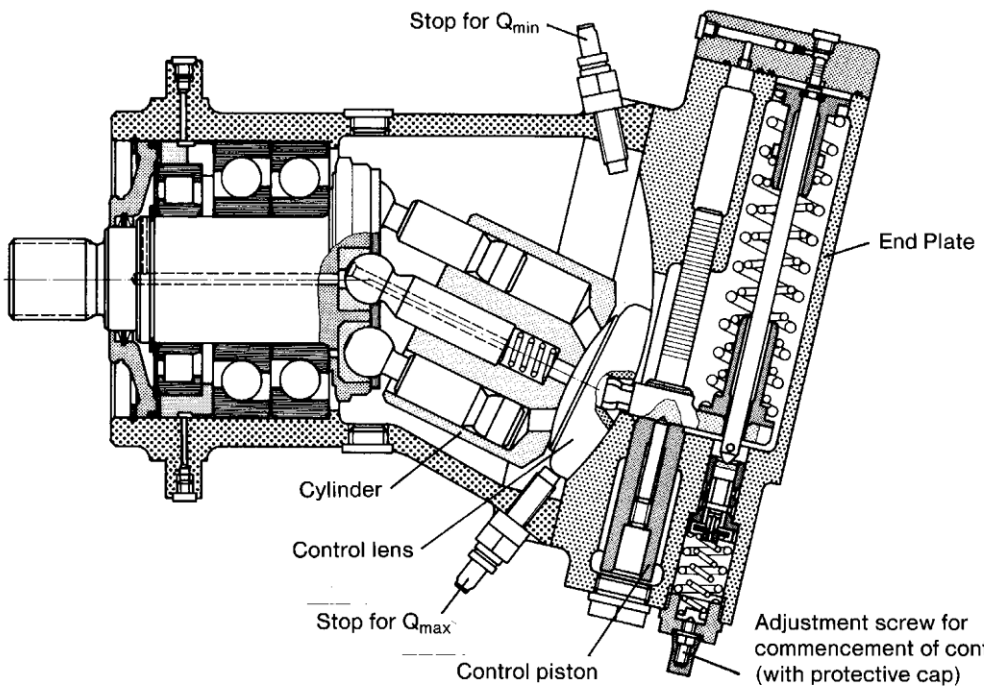
Robust roller bearings for high loads.

Hydrostatic unloading of bearings possible for continous pressures up to 350 bar.

Operation on both mineral and fire-resistant fluids.

Improved port plate design and compact construction reduces noise level by 5 dBA.

Section – Variable displacement Pump A7V, Series 5.1, with Constant Horsepower Control LV



Variable Displacement Pump A7V, Series 5.1

Ordering Code

Short Code

A7V	500	LV	5.1	L	Z	F	O	O	Further details in clear text

Pump Type

Axial piston variable displacement pump	A7V

Size

0 – 250 cm³	250
0 – 355 cm³	355
0 – 500 cm³	500
0 – 1000 cm³	1000

(Displacement $V_{g\ min}$–$V_{g\ max}$)

Control Device

Constant horsepower control	LV
Constant pressure control	DR
Electrical control (with prop. solenoid)	EL
Hydraulic control, pressure related	HD
Manual control (with handwheel)	MA

Series

Series	5.1

Direction of Rotation (viewed on shaft end)

clockwise	R
anti-clockwise	L

Auxiliary Equipment

none	O
with pressure cut-off built-on for LV, EL and HD	D
Constant pressure control, remote controlled (order sequence valve and subplate separately)	F

Auxiliary Equipment

none	O
Stroke limiter, mechanically adjustable (for LV and DR)	M
Stroke limiter, hydraulic (for LV)	H

Pipe Connections

pressure and suction ports SAE-flanges, on side	F
Pressure and suction ports: SAE-flanges, on rear	H*

*) on request

Shaft End

splined shaft DIN 5480	Z
parallel keyed shaft DIN 6885	P

Ordering Example A7V,500.LV.5.1.L.Z.F.O.O
Axial piston variable displacement pump A7V, size 55, with constant horsepower control, series 5.1, anti-clockwise rotation, splined shaft, SAE side flange connections, without auxiliary equipment.

The minimum and maximum flow is normally set at the extreme values ($V_{g\ min}$ and $V_{g\ max}$) by means of two stop screws. If alternative values are required, please indicate inclear text when ordering.
These stop screws and the screw for setting commencement of control are normally secured against unauthorised adjustement by protective caps before leaving the factory.

Availability of Control Devices, Auxiliary Equipment and Direction of Rotation related to Pump Sizes

Size			250	355	500	1000
Constant horse-power control		without pressure cut-off	•	•	•	•
		with pressure cut-off	•	•	•	•
	Auxiliary Equipment	stroke limiter, mech.	•	•	•	•
		stroke limiter, hydr.	•	•	•	•
DR Constant pressure control		standard model	•	•	•	•
		remote controlled	•	•	•	•
	Aux. Equipment	stroke limiter, mech.	•	•	•	•
EL Electrical control		without pressure cut-off	•	•	•	
		with pressure cut-off	•	•	•	
HD Hydraulic control, pressure related		without pressure cut-off	•	•	•	•
		with pressure cut-off	•	•	•	•
MA Manual control			•			

Technical Data

Operating Pressure Range – Inlet Side

Absolute pressure at port S (suction inlet)

$p_{abs\ min}$ ——— 0,8 bar

$p_{abs\ max}$ (see case drain pressure)

Operating Pressure Range – Outlet Side

Pressure at port A or B

Rated pressure ——— p_N = 350 bar

Peak pressure ——— p_{max} = 400 bar

(Pressure data to DIN 24312)

For pulsating pressures in excess of 315 bar we recommend the use of the models with splined shaft (DIN 5480).

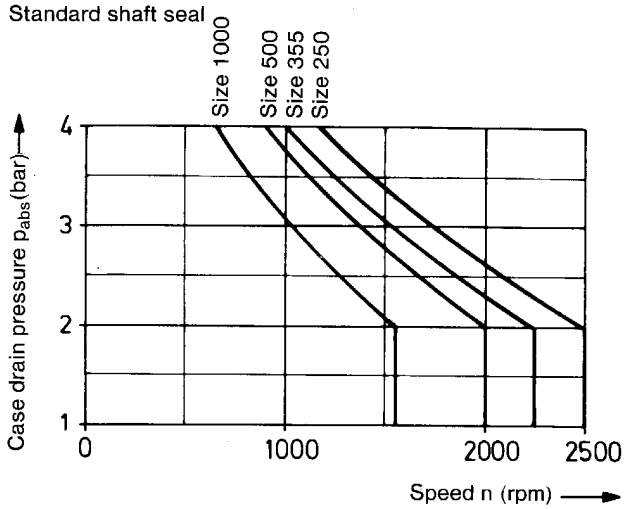
Case Drain Pressure

Max. permissible case drain pressure

p_{max} ——— 4 bar abs.

The permissible pressure is, however, dependent on speed.

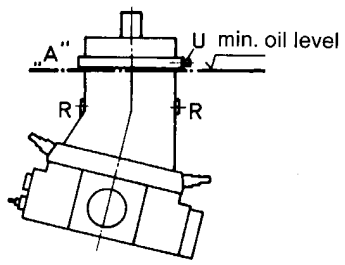
Standard shaft seal



A higher case drain pressure is possible by using mechanical seals (see RE 94104). When ordering, please indicate in clear text: "with mechanical seal".

Mounting Position: Optional. The pump housing must always be filled with oil. When mounting within a tank the plug must be removed from ports R and one of these ports must be at the top.

Note:
With vertical mounting, with drive shaft pointing upwards: The min. oil level must not fall below line "A".



When mounting within a tank, the plugs must be removed from ports R.

When mounting outside the tank, the pump must be bled at port U prior to commissioning.

With manual control MA:
The axis of the handwheel must be horizontal (because of position indicator on handwheel).

Direction of flow

clockwise rotation	anti-clockwise rotation
S to **B**	S to **A**

Hydraulic Fluid

Operating Viscosity Range

For optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected in the range

ν_{opt} = optimum operating viscosity 16 ... 36 mm²/s

as referred to tank temperature (open circuits).

Limits of Viscosity Range

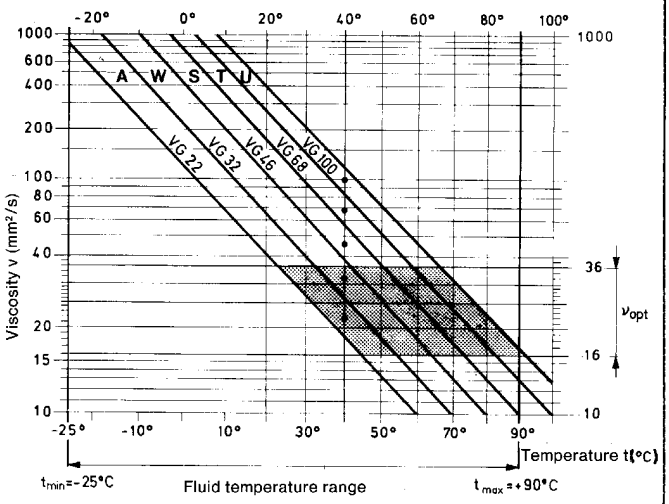
For extreme operating conditions, the following values apply:

ν_{min} = 10 mm²/s
for short periods with a max.permissible leakage oil temperature of 90 °C.

ν_{max} = 1000 mm²/s
for short periods upon cold start.

For detailed information on the selection of hydraulic fluids on mineral oil base and application conditions, please see our catalogue sheet RE 90220 prior to project design.

Selection Diagram



Notes on the Selection of the Hydraulic Fluid

For correct selection of the hydraulic fluid, it is necessary to know the operating temperature in the tank (open circuits) in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range the operating viscosity lies within the optimum range ν_{opt} (see selection diagram, shaded section).We recommend that the higher viscosity grade be selected in each case.

Example: At an ambient temperature of X °C, the operating temperature in the circuit is 60 °C. In the optimum operating viscosity range (ν_{opt}, shaded section), this corresponds to viscosity grades VG 46 or VG 68; VG 68 should be selected.

Important: The leakage oil temperature is influenced by pressure and speed and is always higher than the tank temperature, but may not be higher than 90 °C.

If is not possible to keep within the above conditions because of extreme operating parameters or high ambient temperature, we recommend flushing the bearings via port U.

Flushing fluid flows	Size	250	355	500	1000
	Q_{Sp} l/min	12,5	16,	25	40

Temperature of the flushing fluid ⩽ tank temperature.

Filtration

Recommended filtration 10 µm. Coarser filtration of 25 – 40 µm is possible, but longer component life will be achieved using 10 µ filtration due to lower component wear.

Technical Data

(theoretical values, without considering mech.-hyd. and volumetric efficiency)

Size		Size		250	355	500	1000
Displacement		$V_{g\,max}$	cm^3	250	355	500	1000
		$V_{g\,min}$	cm^3	0	0	0	0
Max. speed[1])	at $V_{g\,max}$	$n_{0\,max\,1}$	rpm	1500	1320	1200	950
	at $V_g < V_{g\,max}$ (see diagram)	$n_{0\,max\,2}$	rpm	2050	1800	1640	1300
Max. perm. speed (speed limit) with increased inlet pressure p_{abs} (see diagram below)		$n_{0\,max\,perm}$	rpm	2500	2240	2000	1600
Max. flow[2])	at $n_{0\,max\,1}$ ($V_{g\,max}$)	$Q_{0\,max\,1}$	l/min	364	455	582	921
	at $n_{0\,max\,2}$ ($V_g < V_{g\,max}$)	$Q_{0\,max\,2}$	l/min	318	396	509	807
Max. power (Δp = 350 bar)	at $Q_{0\,max\,1}$	$P_{0\,max\,1}$	kW	218	273	350	554
	at $Q_{0\,max\,2}$	$P_{0\,max\,2}$	kW	191	238	306	485
Torque (Δp = 100 bar)	at $V_{g\,max}$	M	Nm/100 bar	397,5	564,5	795	1590
Max. torque (Δp = 350 bar)	at $V_{g\,max}$	M_{max}	Nm	1391	1975	2782	5565
Moment of inertia about the dirve axis		J	kgm^2	0,088	0,160	0,270	0,824

[1]) The values shown are valid with an absolute pressure at suction inlet S and when operated on mineral oil.
When idling, overspeeding by 50 rpm is permissible at $n_{0\,max\,2}$.

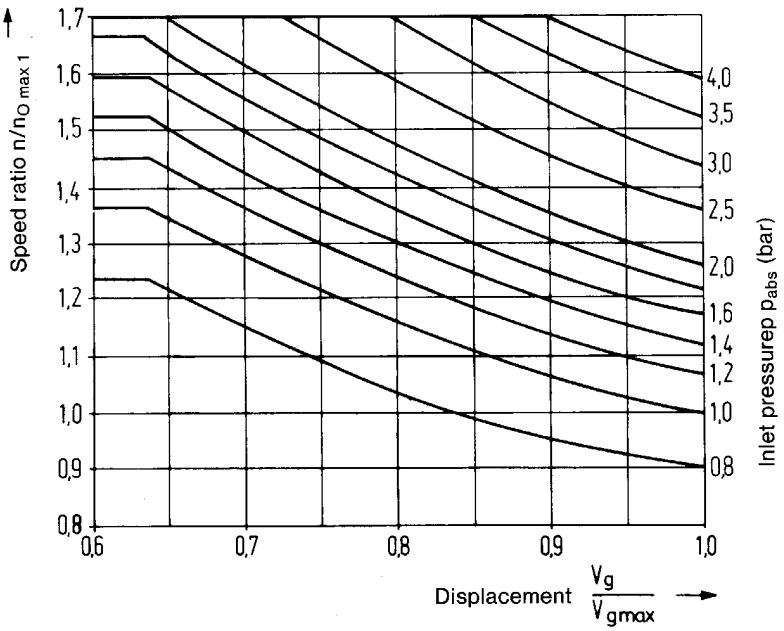
[2]) Calculated with a volumetric efficiency of 97%.
By increasing the inlet pressure ($p_{abs} > 1$ bar), speeds can be increased up to "max. perm. speed (speed limit)". (See diagram).

Calculation

Flow	$Q = \frac{V_g \cdot n \cdot \eta_v}{1000}$	[l/min]
Drive Torque	$M = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}$	[Nm]
Drive Power	$P = \frac{2\pi \cdot M \cdot n}{60\,000} = \frac{M \cdot n}{9549} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t}$	[kW]

V_g = geom. displacement per rev. (cm^3)
Δp = differential pressure (bar)
n = speed (rpm)
η_v = volumetric efficiency
η_{mh} = mech-hyd. efficiency
η_t = overall efficiency
[$\eta_t = \eta_v \cdot \eta_{mh}$]

Calculation of Inlet Pressure p_{abs} at Suction Inlet S and of Reduction in Displacement at Increased Speeds.



Example:

Given:
Size 500
Drive speed 1345 rpm

Required:
pressure p_{abs} at suction inlet S

Solution:
speed ratio

$$\frac{n}{n_{o\,max\,1}} = \frac{1345}{1200} = 1{,}12$$

gives an inlet pressure of p_{abs} = 1.4 bar at full swivel ($V_{g\,max}$).
If for example free flow is only possible with p_{abs} = 1 bar, the displacement must be reduced to 84.5%.

Note:
Max. perm. speed $n_{O\,max.\,perm.}$ (speed limit)
Min. and Max. perm. suction pressure at port S.

Constant Horsepower Control LV

The constant HP control regulates flow in relation to pressure, thereby maintaining hydraulic power constant.

$$P = \frac{p \cdot Q}{600} = \text{constant}$$

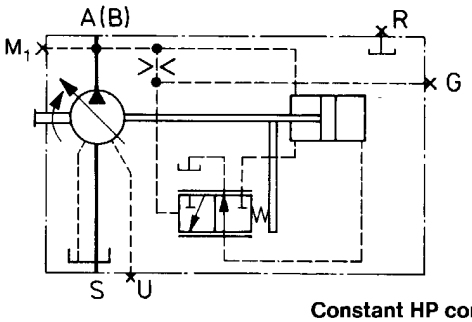
P = power [kW]
p = pressure [bar]
Q = flow [l/min]

(Provided that the drive speed is constant).

Operating pressure acts on a pilot piston, causing is to press on a set of springs. If the hydraulic force exceeds the spring force, pilot oil is fed to the adjusting piston, which swivels the pump back to a smaller angle and therefore a smaller flow.

Start of control: 50 bar min.

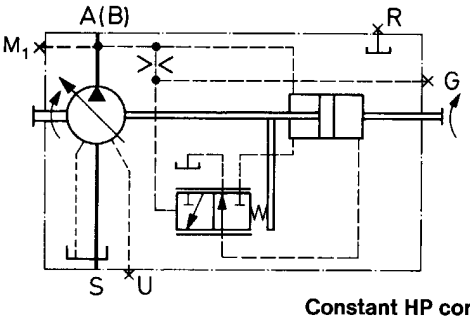
Summation HP control possible by means of throttles via port G.



Constant HP control LV

Auxiliary Equipment: Stroke Limiter

By means of a mechanical or hydraulic stroke limiter, the max. displacement can be infinitely varied or limited. Adjustment range from $V_{g\,max}$ to $V_{g\,min}$.

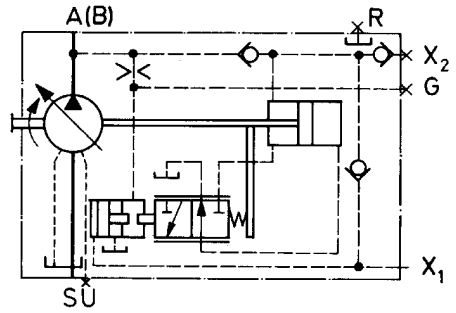


Constant HP control LV with mechanical stroke limiter

Size		250	355	500
Spindle revolutions	$U_{S\,max}$	21,25	24	25

Connections (Pump)

A, B	service lines	T_1	pilot oil return line
S	suction line	R	air bleed
G	port of summation HP control	U	flushing port (for flushing of bearings)
X_1	pilot pressure	M	gauge connection (operating pressure)
X_2	remote control pressure		

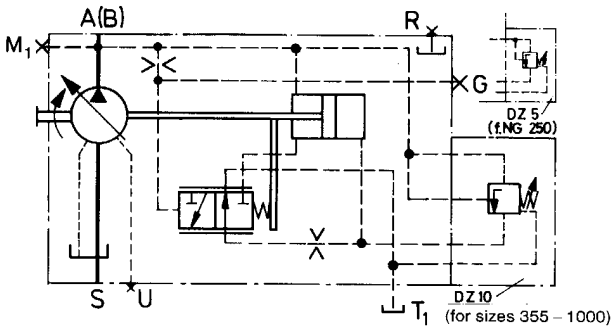


Constant HP control LV with hydraulic stroke limiter

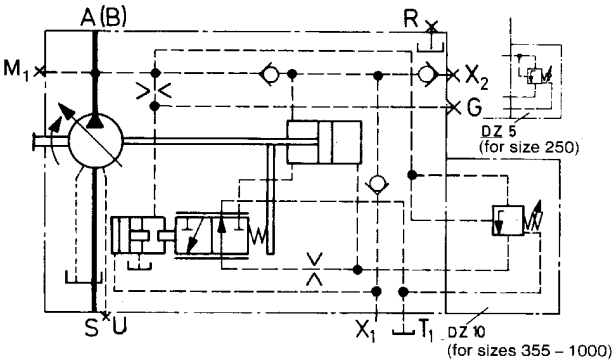
A pilot pressure (port X_1) of at least 10 % of the operating pressure is required for the hydraulic stroke limiter. Max. permissible pressure at port X_1 = 200 bar (for all sizes).
If it is required to limit the flow at an operating pressure < 50 bar, then a boost pressure of min. 50 bar must be applied at port X_2.

Auxiliary Equipment: Pressure Cut-Off

The pressure cut-off is a constant pressure control superimposed on the constant HP control, and is carried out by means of a sequence valve. When the set maximum pressure is reached (control range up to 315 bar), the valve opens and the flow is automatically reduced (to Q = O).
The sequence valve is mounted directly on the pump.



Constant HP control LV with pressure cut-off



Constant HP control LV with pressure cut-off and hydraulic stroke limiter

Continuous Operation in Zero Position

see constant pressure control DR

Approximate values at speed n = 980 rpm
Fluid temperature t = 50 °C

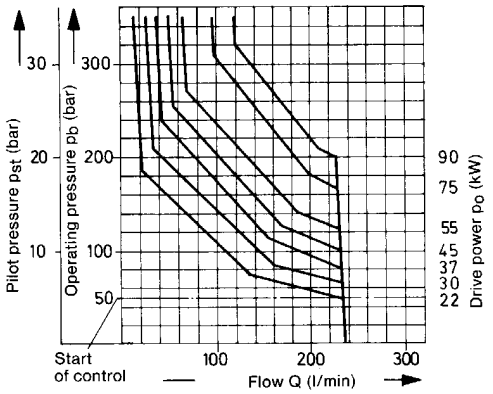
Conversion to speeds n (rpm) other than n_o

Drive power $P = P_o \cdot \frac{n}{n_o}$ Flow $Q_n = Q \cdot \frac{n}{n_o}$

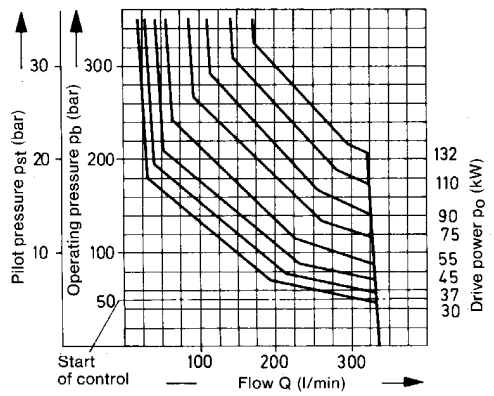
Q-p-Characteristics for LV

without Pressure Cut-Off

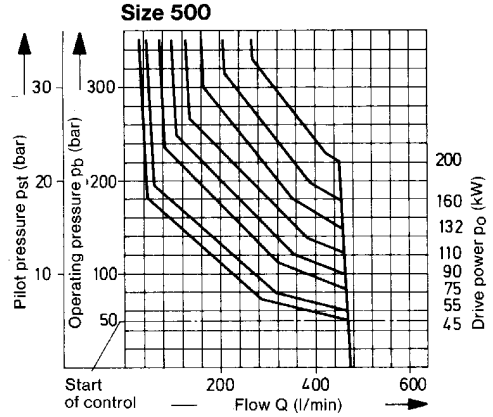
Size 250



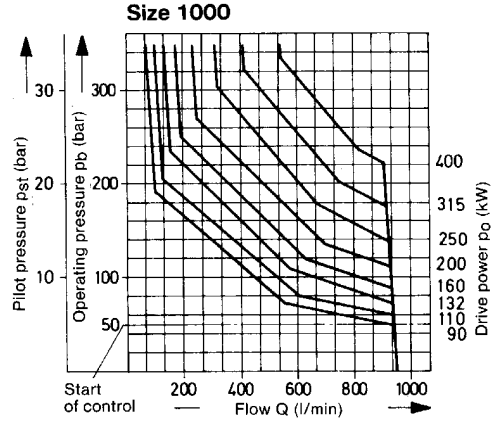
Size 355



Size 500

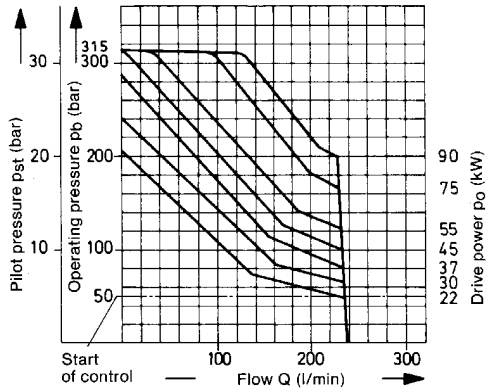


Size 1000

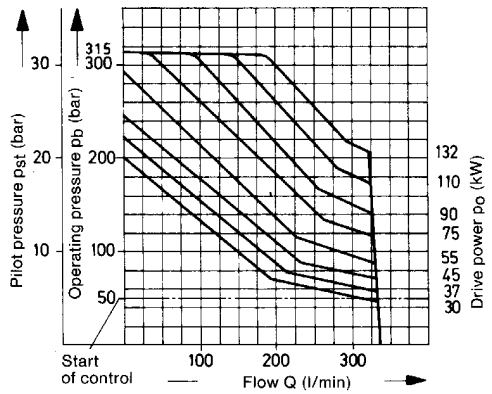


with Pressure Cut-Off

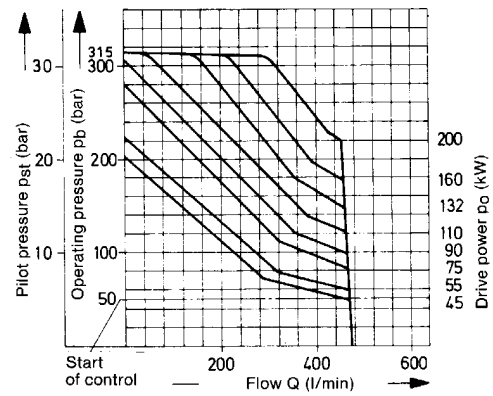
Size 250



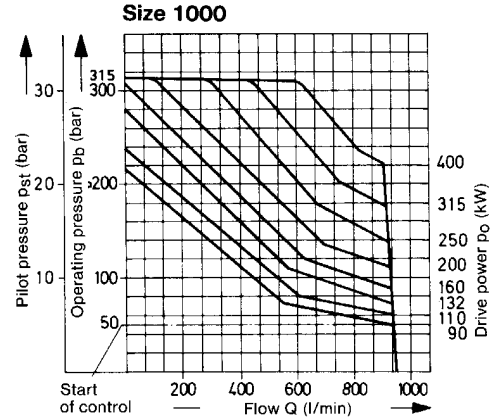
Size 355



Size 500



Size 1000

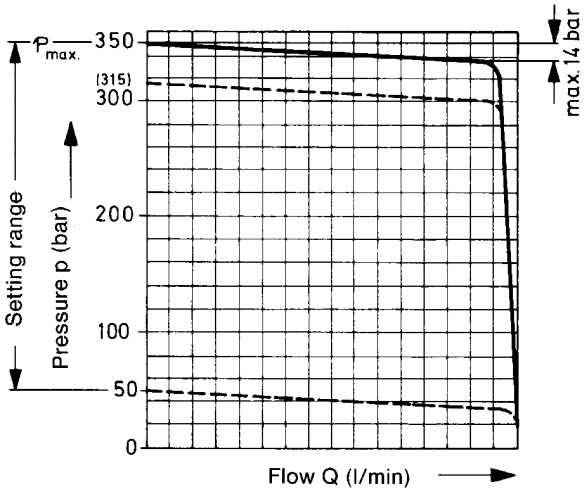


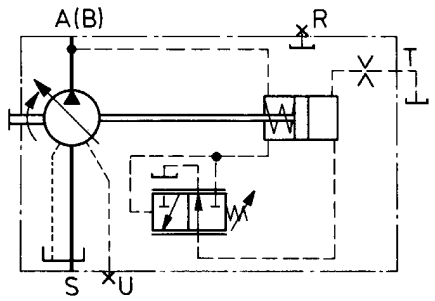
Constant Pressure Control DR

The constant pressure control maintains the pressure in a hydraulic system within its control range in spite of changing pump flow requirements. The variable pump supplies only the volume of fluid required by the services. Should operating pressure exceed the set pressure, the pump is automatically swivelled back to a smaller angle and the deviation in control corrected.
The required pressure is set either direct at the pump (valve built-in, standard model) or at the separate sequence valve for the model with remote control.

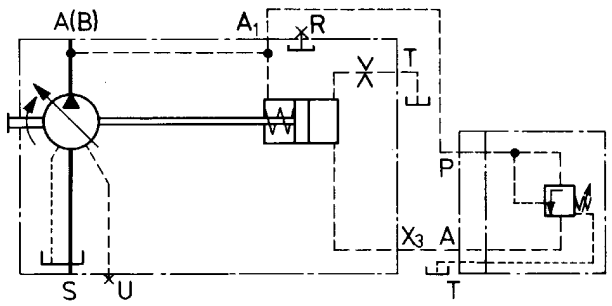
Setting range from 50 to 350 bar.

Setting range for remote control 50 to 315 bar.





Constant pressure control DR (valve built-in)



Constant pressure control DR (remote controlled)

Note: Port T from the sequence valve must be piped separately to tank (cooler).

Parallel Operation

For parallel operation each individual pump requires its own sequence valve.

Remote control

Order sequence valve and subplate separately:

Sequence valve for size 250	DZ5DP2-1X/315YS021 (part No. 154869)
Sequence valve for sizes 355-1000	DZ10DP2-12/315YMS049 (part No. 154972)
Subplate for size 250	G 115/1 (Part No. 153138)
Subplate for sizes 355-1000	G 461/1 (Part No. 154363)

The max. single pipe length should not exceed 5 m.

Note: A pressure relief valve installed in the system for protection of the max. pressure must be set 20 bar above the setting of the constant pressure control.

Auxiliary Equipment: Stroke Limiter

The max. displacement can be steplessly limited between $V_{g\,max}$ and $V_{g\,min}$ by means of a mechanical stroke limiter. For details see control device LV.

Continuous Operation in Zero Position

Zero stroke operation without flushing of housing
short periods < 10 min long periods
~ 50 % duty

max. perm. pressure p_{max} (bar)	max.perm. tank temperature t_{max} (°C)	max. perm. pressure p_{max} (bar)	max. perm. tank temperature t_{max} (°C)
315	50	200	50

Zero stroke operation with flushing of housing via long-term Port U.

max. perm. pressure p_{max} (bar)	max. perm. tank temperature t_{max} (°C)
315	50

Flushing flow	Size	250	355	500	1000
	Q_{sp} l/min	12,5	16	25	40

Temperature of flushing fluid ⩽ tank temperature

Connections (Pump)

A, B	service lines
S	suction line
A_1,X_3	ports for remote control valve
T	pilot oil return line
R	air bleed
U	flushing port (for flushing of bearings)

Electrical Control EL

The electric control permits stepless and programmable adjustment of the pump displacement. Adjustment is proportional to the solenoid force, i.e. the strength of current. The control force on the control piston is generated by a solenoid.

For the control of the proportional valve, a DC supply of 24 V between 250 and 750 mA is required.

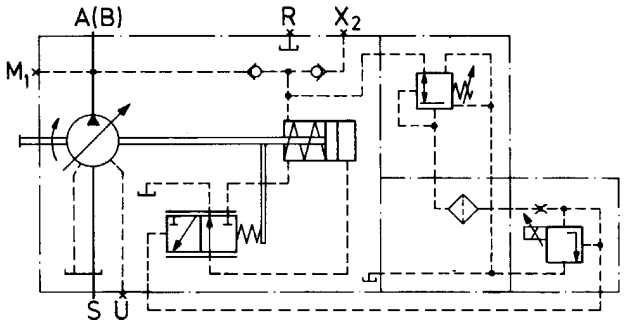
Control is from $V_{g\,min}$ to $V_{g\,max}$.

Pilot pressure range 10 – 45 bar.
The pilot pressure increase over the complete control range is 35 bar.

Start of control at approx. 250 mA ≙ 10 bar pilot pressure.
End of control at approx. 700 mA ≙ 45 bar pilot pressure.

Insulation to DIN 40050 IP65

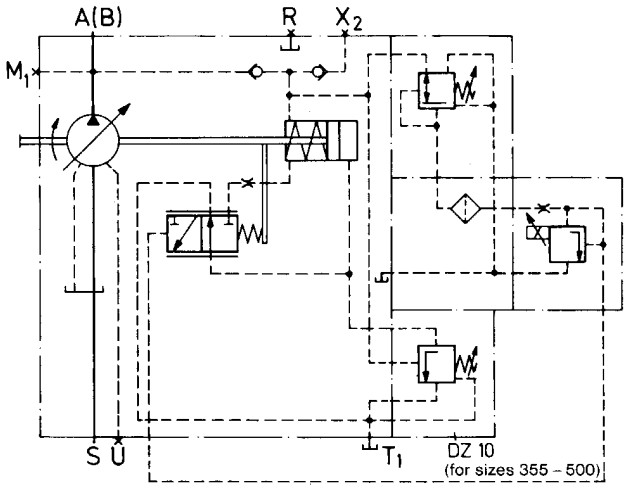
The necessary control oil is taken from the high pressure circuit, a minimum operating pressure of 50 bar being required. If necessary, an auxiliary pressure of 50 bar should be applied at port X_2.



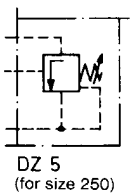
Electric Control EL

Auxiliary Equipment: Pressure Cut-Off

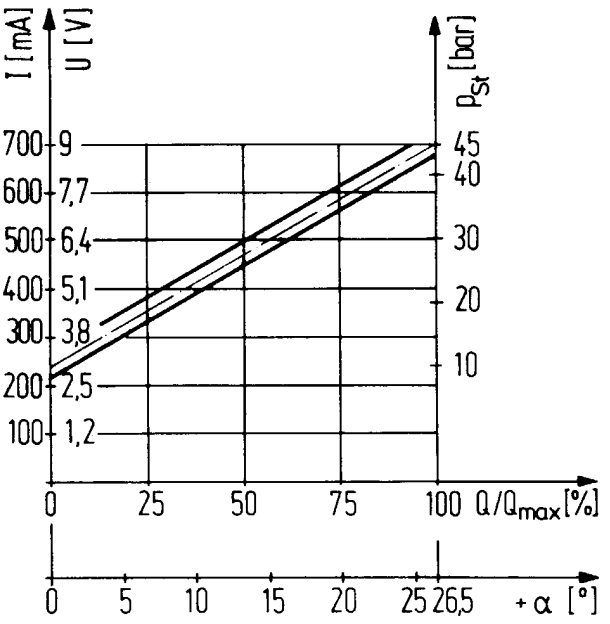
For description see control device HD.



Electric control EL with pressure cut-off



Control Curve



Electronic control is by means of amplifier type VT 2000 S 20 to Rexroth catalogue sheet RE 29911.

Continuous Operation in Zero Position

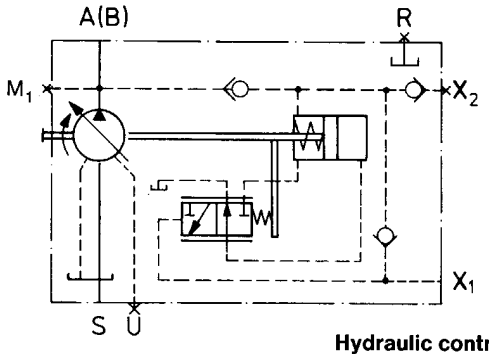
For details see constant pressure control DR

Connections (Pump)

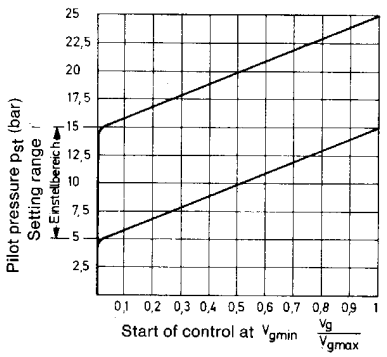
A, B	service lines
S	suction line
X_2	remote control pressure
T_1	pilot oil return line (tank)
R	air bleed
M_1	gauge connection (operating pressure)
U	flushing port (for flushing of bearings)

Hydraulic Control, Pressure Related, HD

The hydraulic control, pressure related, permits the stepless adjustment of the pump displacement in relation to pilot pressure. Adjustment is proportional to the pilot pressure at port X_1.
When using the HD control as 2-position control ($V_{g\ min}$ to $V_{g\ max}$), the pilot oil pressure on port X_1 must not exceed 40 bar.
Adjustment is from $V_{g\ min}$ to $V_{g\ max}$.
The increase in pilot pressure over the complete control range (min – max) is 10 bar.
The setting range for start of control is between 5 and 15 bar (other values on enquiry).
The necessary control oil is taken from the high pressure circuit, and a minimum operating pressure of 40 bar is required. If necessary apply pilot pressure of 40 bar at port X_2.
There is no continuous consumption of pilot oil, but leakage of approx. 0.5 l/min must be taken into consideration.

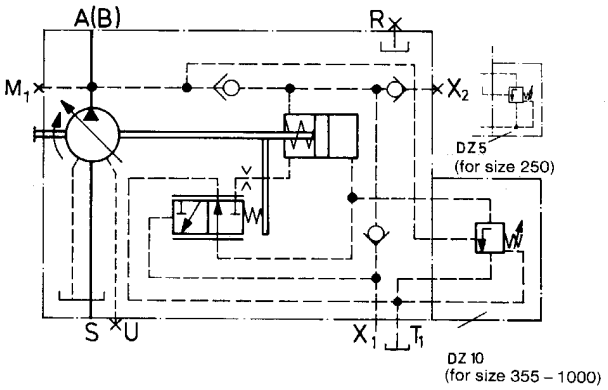


Hydraulic control, pressure related, HD



Additional Function: Pressure Cut-Off

The pressure cut-off serves to limit the flow as a function of the high pressure so that a predetermined operating pressure is not exceeded.
This function is carried out by a sequence valve. On reaching the set maximum pressure (setting range up to 315 bar), the valve opens and the flow is automatically reduced (to Q = 0).
The sequence valve is mounted directly on the pump.



Hydraulic control, pressure related, HD with pressure cut-off

Continuous Operation in Zero Position

For details see constant pressure control DR

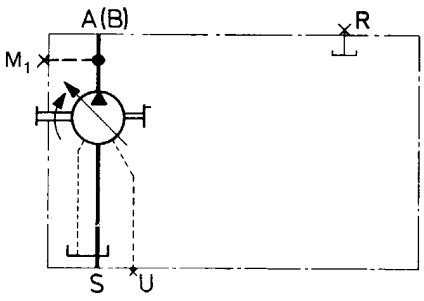
Connections (Pump)

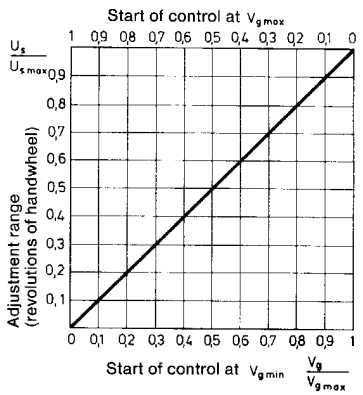
A, B	service lines
S	suction line
X_1	pilot pressure
X_2	remote control pressure
T_1	pilot oil return line (tank)
R	air bleed
M_1	gauge connection (operating pressure)
U	flushing port (for flushing of bearings)

Manual Control, MA

By turning the handwheel, a piston is moved in an axial direction by means of a threaded spindle. A carrier pin moves the control lens on its sliding plane, thus permitting stepless variation of the pump displacement in the range $V_{g\ min}$ to $V_{g\ max}$ or conversely.

Mounting position: Axis of handwheel horizontal (because of pump position indicator in handwheel).



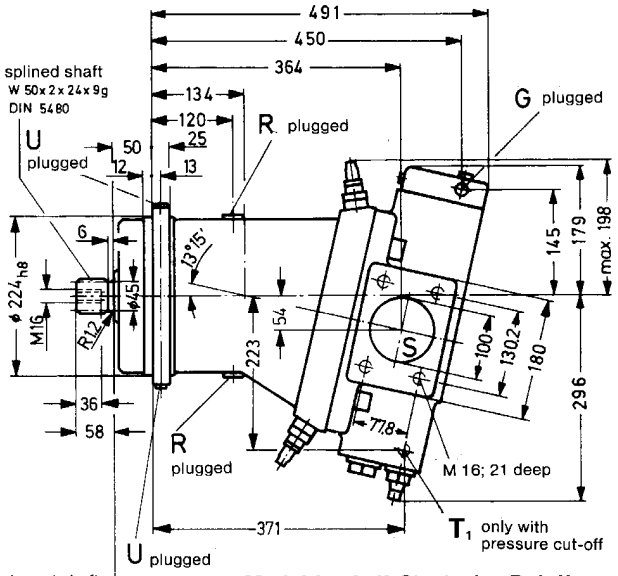


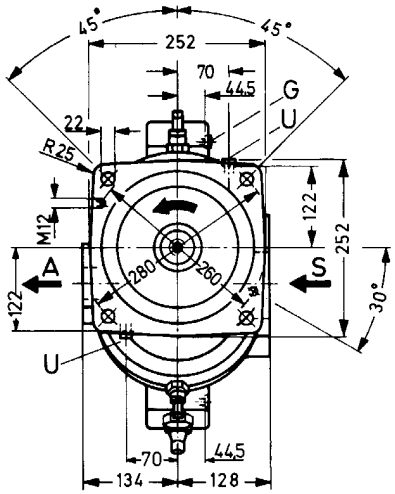
Connections (Pump)

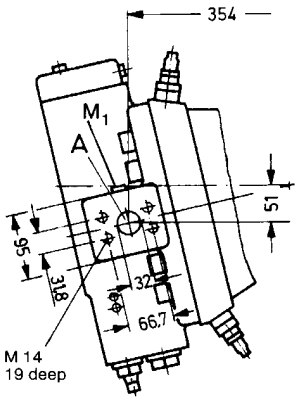
A, B	service lines
S	suction line
R	air bleed
M_1	gauge connection (operating pressure)
U	flushing port (for flushing of bearings)

Unit Dimensions A7V, Size 250

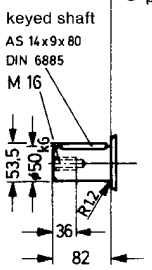
Constant HP Control LV



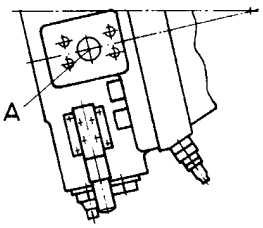




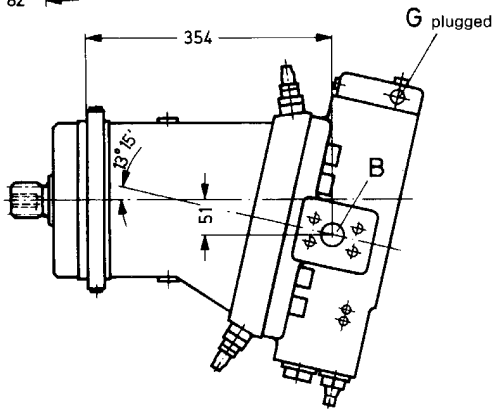
Model for Anti-Clockwise Rotation

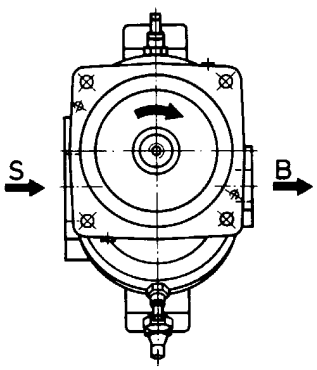


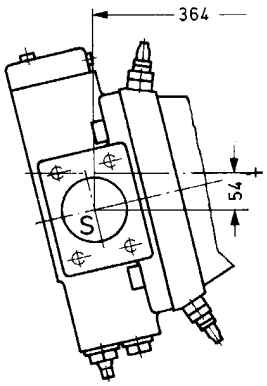
with Pressure Cut-Off

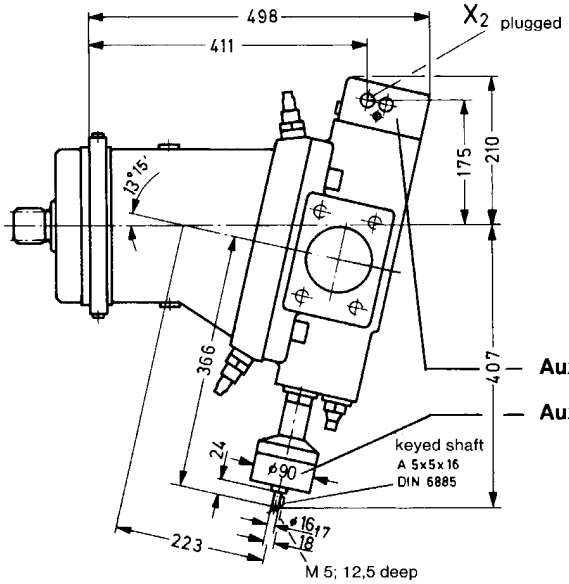


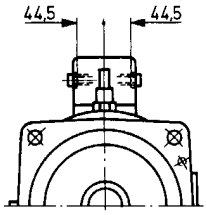
Model for Clockwise Rotation

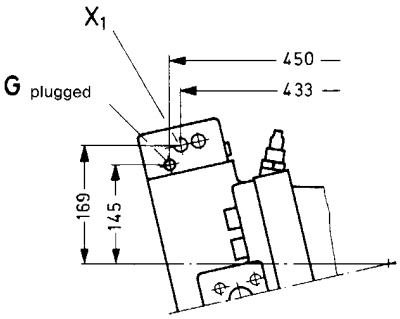












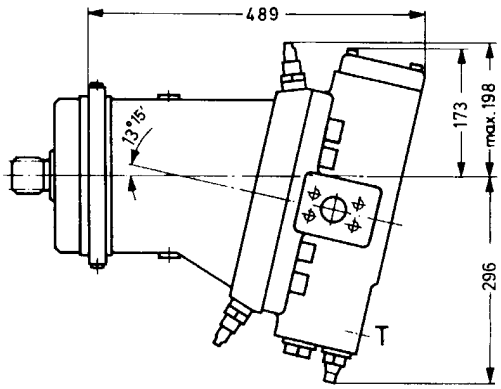
— **Auxiliary equipment: hydraulic stroke limiter (for LV)**

— **Auxiliary equipment: mechanical stroke limiter (for LV and DR)**

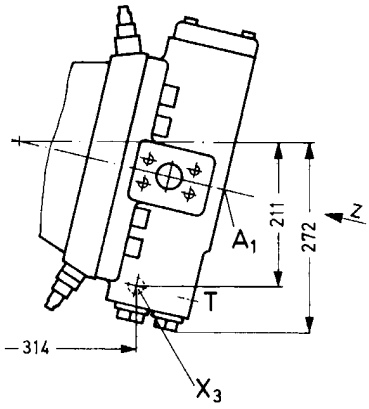
Weight, size 250: approx. 105 kg

Constant Pressure Control DR

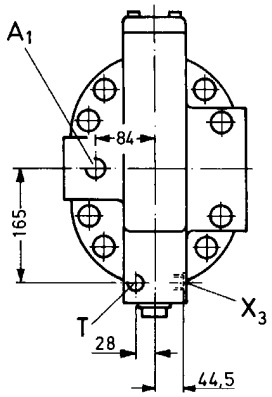
Standard Model



Remote Control

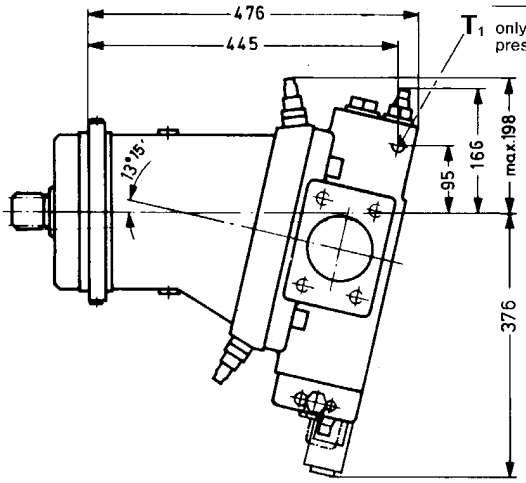


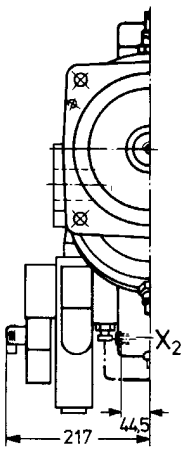
Detail Z



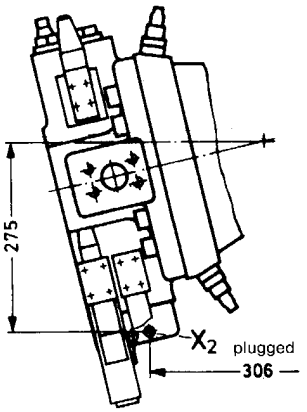
A_1 and X_3 only for remote control

Electric Control EL

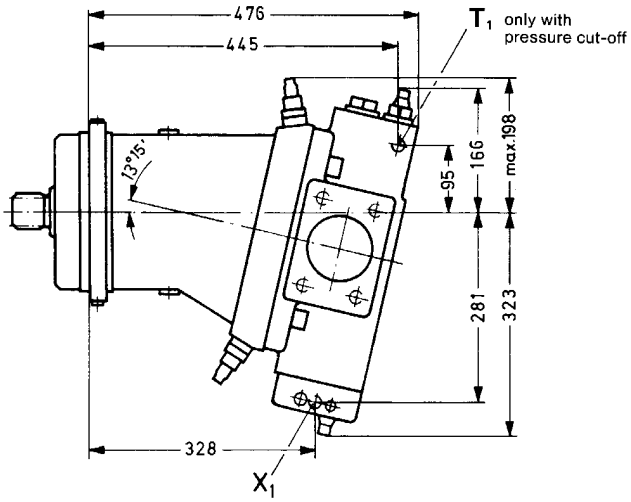




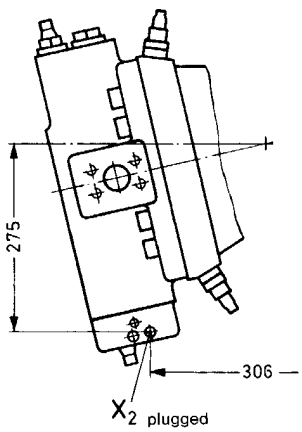
with Pressure Cut-Off

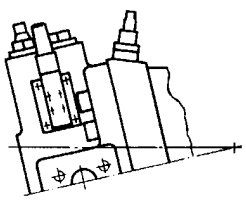


Hydraulic Control, Pressure Related, HD



with Pressure Cut-Off

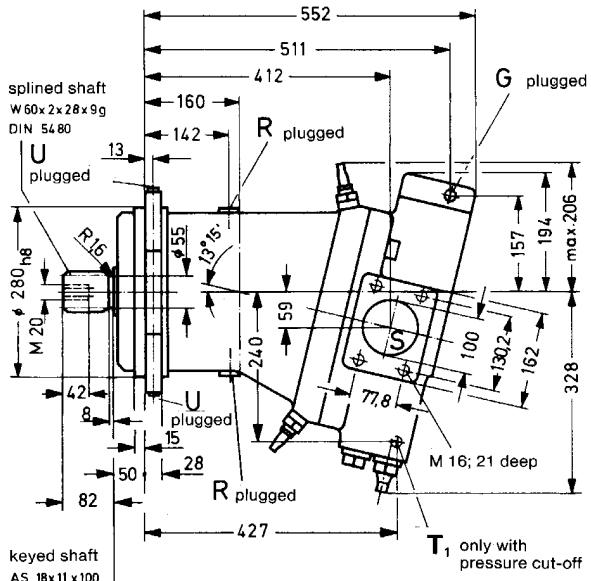


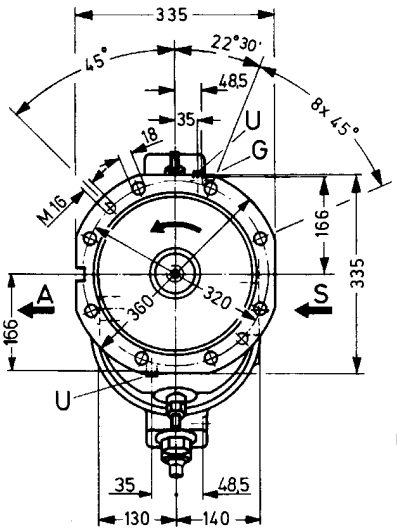


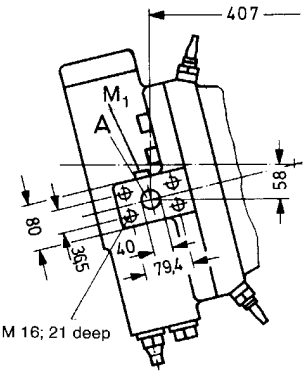
A,B	service lines	SAE 1¼" 420 bar (6000 psi)	A_1,X_3	ports for remote control valve	M 16 x 1,5
S	suction line	SAE 4" 35 bar (500 psi)			
G	remote control pressure (connection for summation HP control)	M 14 x 1,5 (plugged)	T	pilot oil return line	M 16 x 1,5
			T_1	pilot oil return line	M 22 x 1,5
			R	air bleed	M 22 x 1,5 (plugged)
X_1	pilot pressure	M 14 x 1,5	U	flushing port (for flushing of bearings)	M 14 x 1,5 (plugged)
X_2	remote control pressure (HD, EL)	M 14 x 1,5 (plugged)			
			M_1	gauge connection (operating pressure)	M 16 x 1,5 (plugged)

Unit Dimensions A7V, Size 355

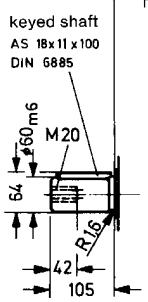
Constant HP Control LV



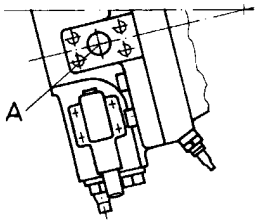




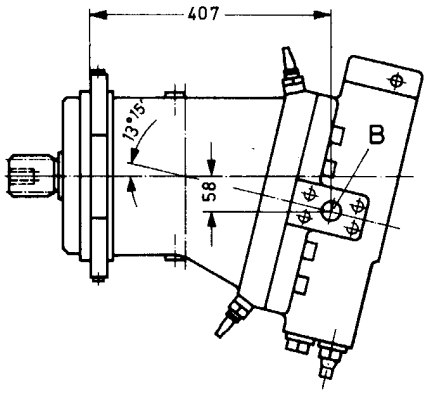
Model for Anti-Clockwise Rotation

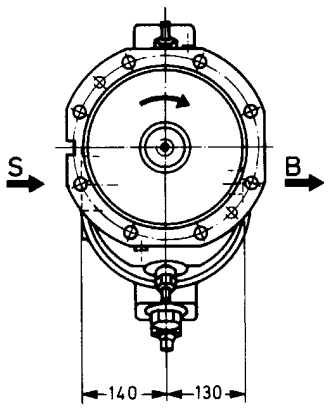


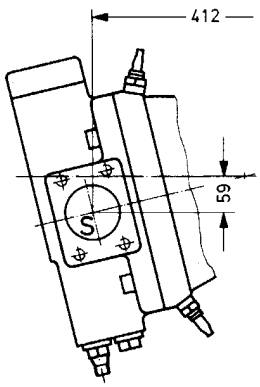
with Pressure Cut-Off

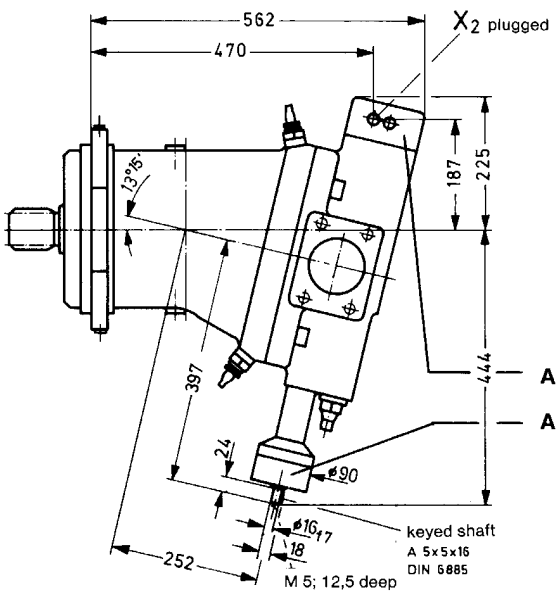


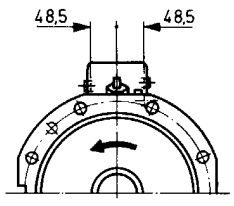
Model for Clockwise Rotation

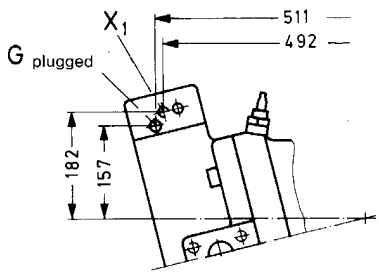












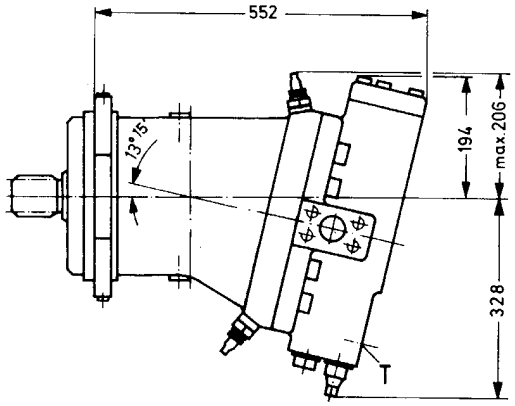
Auxiliary equipment: hydraulic stroke limiter (for LV)

Auxiliary equipment: mechanical stroke limiter (for LV and DR)

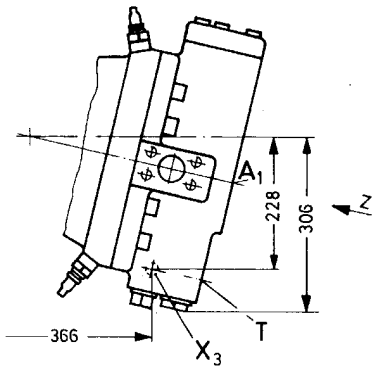
Weight, size 355: approx. 165 kg

Constant Pressure Control DR

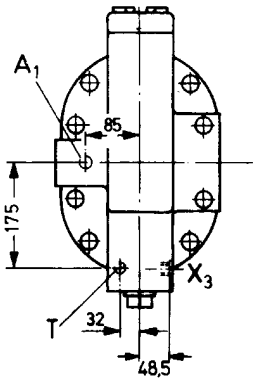
Standard Model



Remote Control

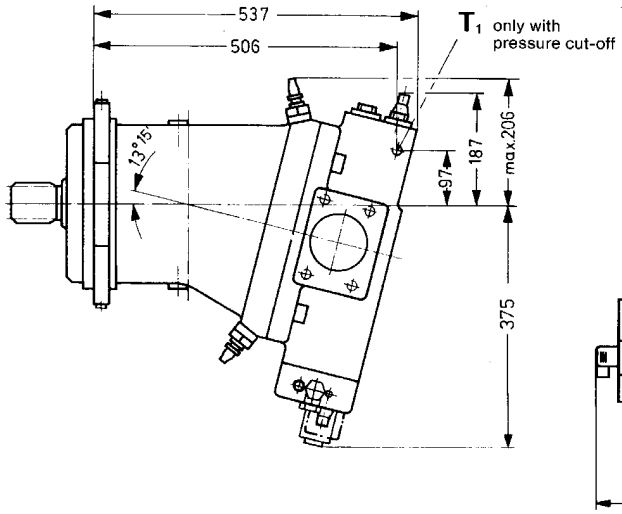


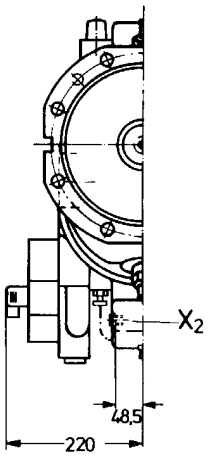
Detail Z



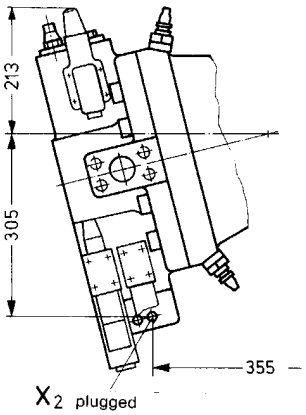
A_1 and X_3 only for remote control

Electric Control EL

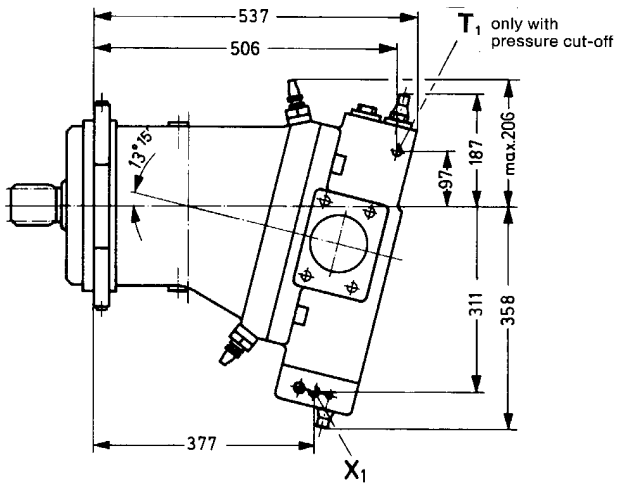


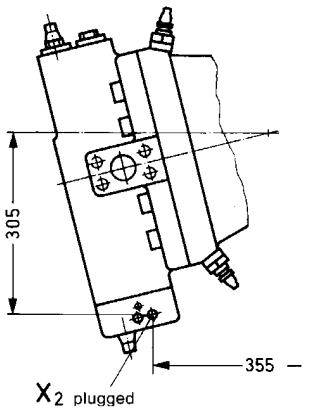


with Pressure Cut-Off

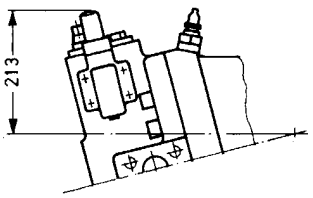


Hydraulic Control, Pressure Related, HD





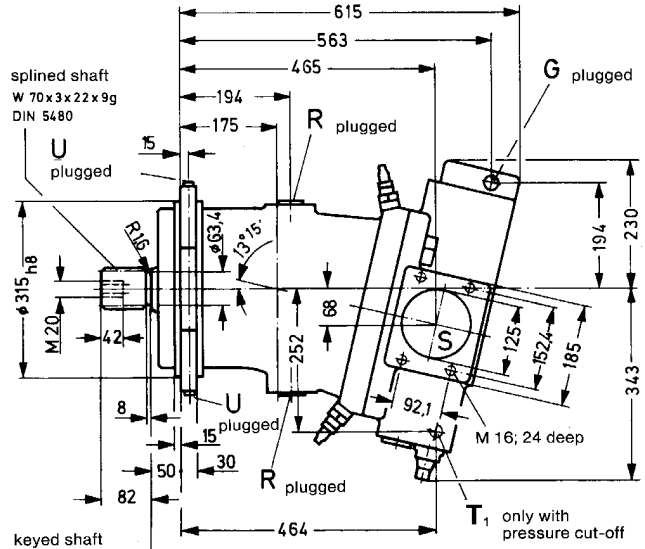
with Pressure Cut-Off

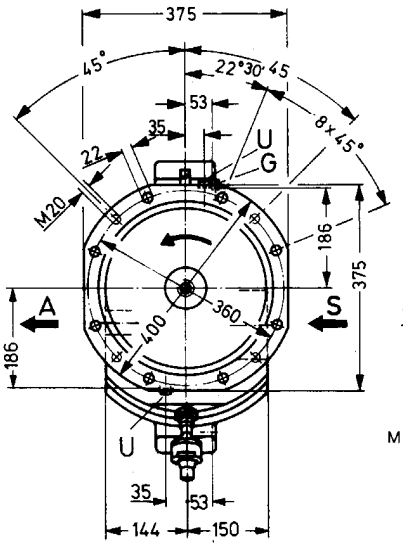


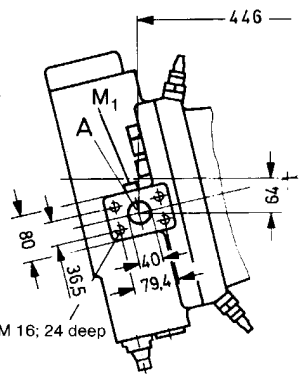
A,B	service lines	SAE 1 1/2" 420 bar (6000 psi)
S	suction line	SAE 4" 35 bar (500 psi)
G	remote control pressure (connection for summation HP control)	M 16 x 1,5 (plugged)
X_1	pilot pressure	M 16 x 1,5
X_2	remote control pressure (HD, EL)	M 16 x 1,5 (plugged)
A_1,X_3	ports for remote control valve	M 22 x 1,5
T	pilot oil return line	M 16 x 1,5
T_1	pilot oil return line	M 22 x 1,5
R	air bleed	M 33 x 2 (plugged)
U	flushing port (for flushing of bearings)	M 14 x 1,5 (plugged)
M_1	gauge connection (operating pressure)	M 16 x 1,5 (plugged)

Unit Dimensions A7V, Size 500

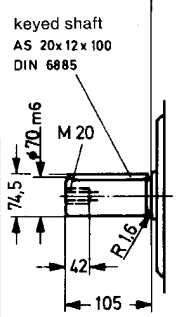
Constant HP Control LV





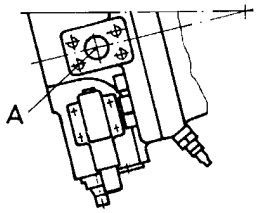


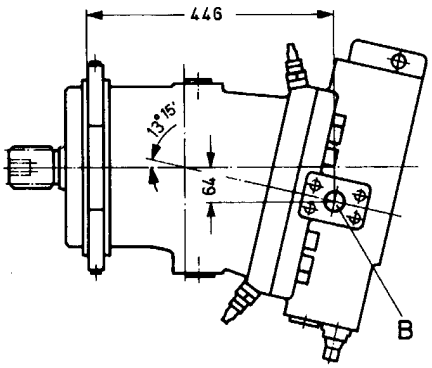
Model for Anti-Clockwise Rotation

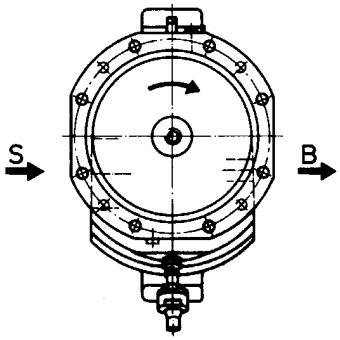


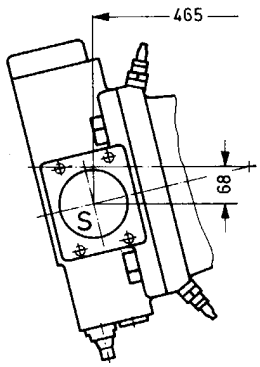
Model for Clockwise Rotation

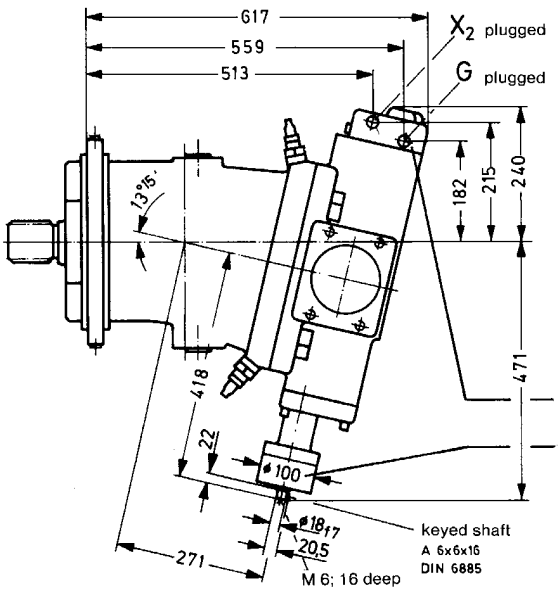
with Pressure Cut-Off

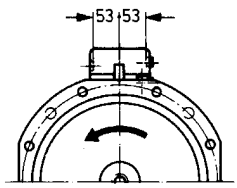


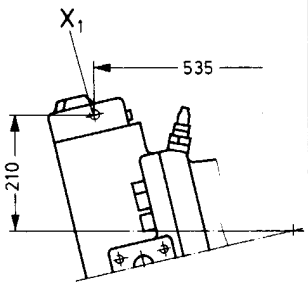












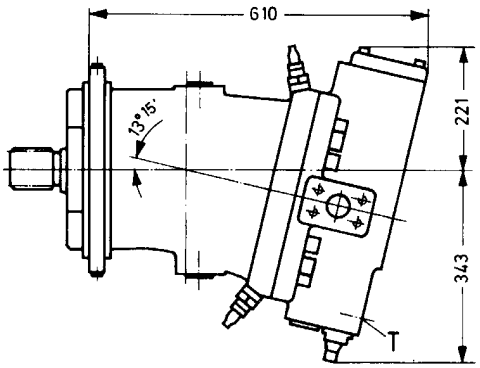
Auxiliary equipment: hydraulic stroke limiter (for LV)

Auxiliary equipment: mechanical stroke limiter (for LV and DR)

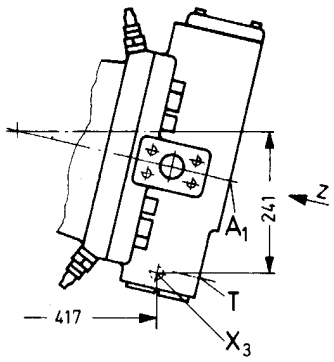
Weight, size 500: approx. 245 kg

Constant Pressure Control DR

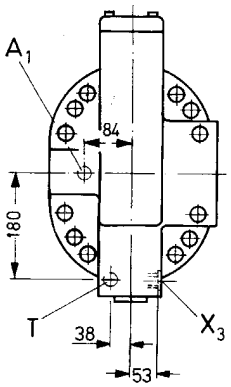
Standard Model



Remote Control

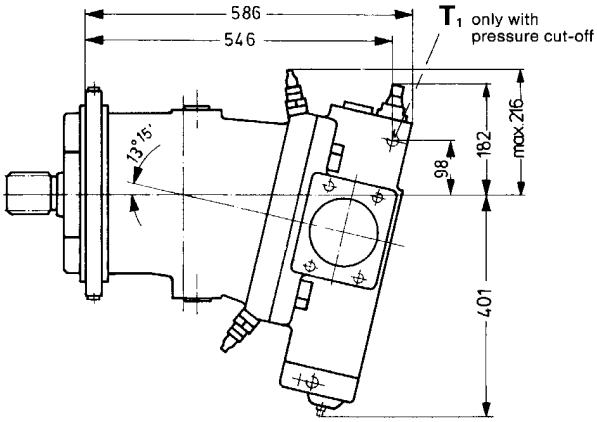


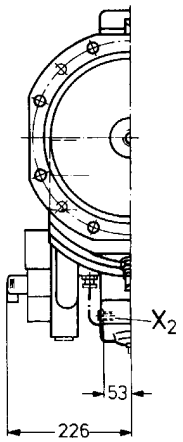
Detail Z



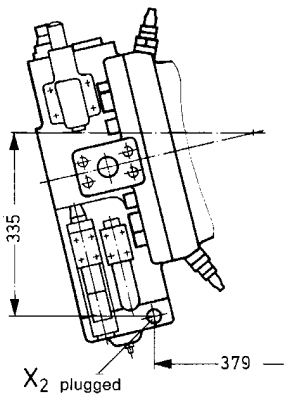
A_1 and X_3 only for remote control

Electric Control EL

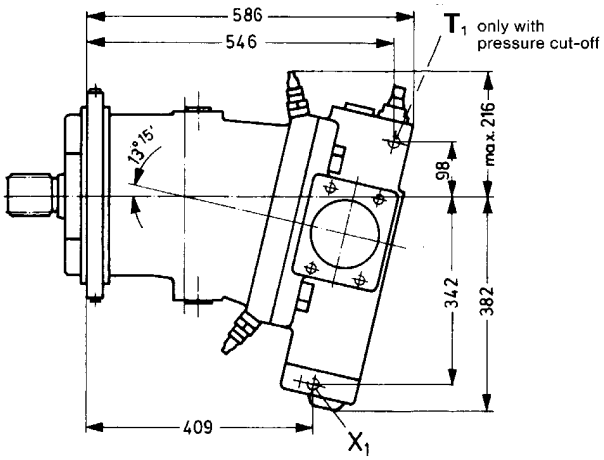


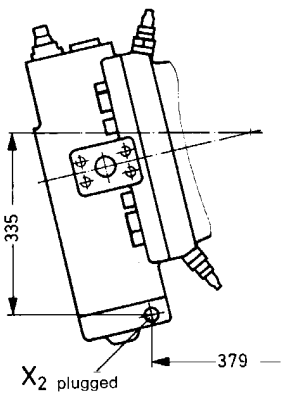


with Pressure Cut-Off

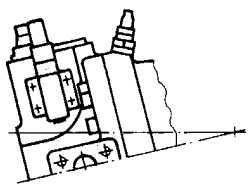


Hydraulic Control, Pressure Related, HD





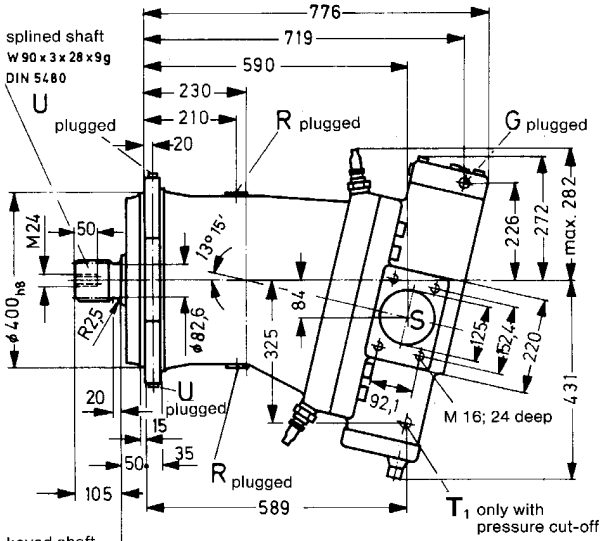
with Pressure Cut-Off

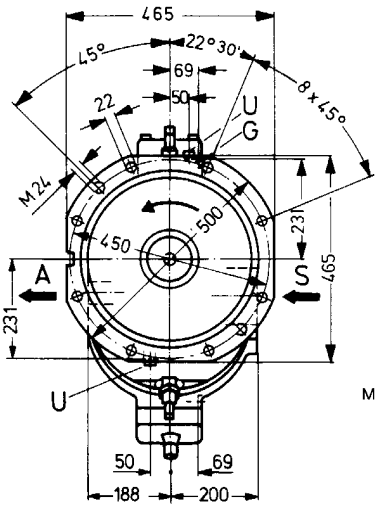


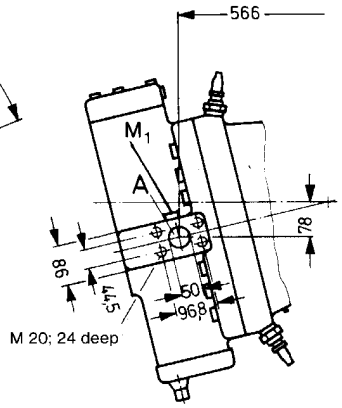
A,B	service lines	SAE 1 1/2" 420 bar (6000 psi)
S	suction line	SAE 5" 35 bar (500 psi)
G	remote control pressure (connection for summation HP control)	M 16 x 1,5 (plugged)
X_1	pilot pressure	M 16 x 1,5
X_2	remote control pressure (HD, EL)	M 16 x 1,5 (plugged)
A_1,X_3	ports for remote control valve	M 22 x 1,5
T	pilot oil return line	M 16 x 1,5
T_1	pilot oil return line	M 22 x 1,5
R	air bleed	M 33 x 2 (plugged)
U	flushing port (for flushing of bearings)	M 18 x 1,5 (plugged)
M_1	gauge connection (operating pressure)	M 16 x 1,5 (plugged)

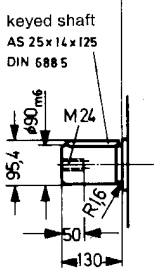
Unit Dimensions A7V, Size 1000

Constant HP Control LV



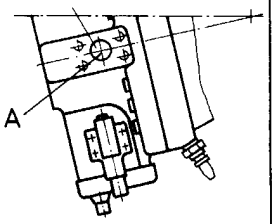




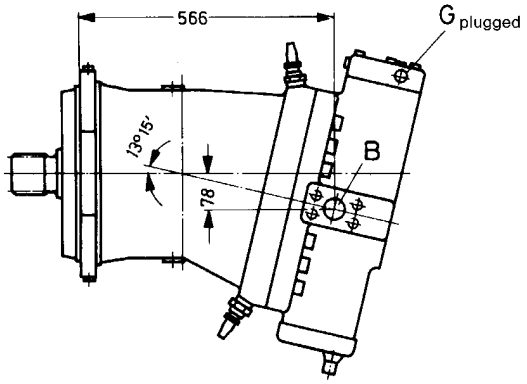


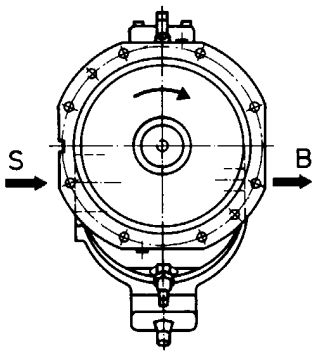
Model for Anti-Clockwise Rotation

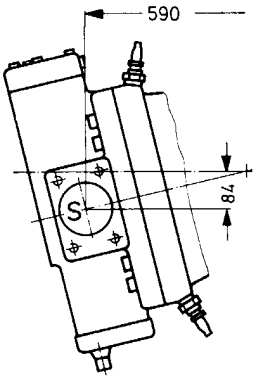
with Pressure Cut-Off

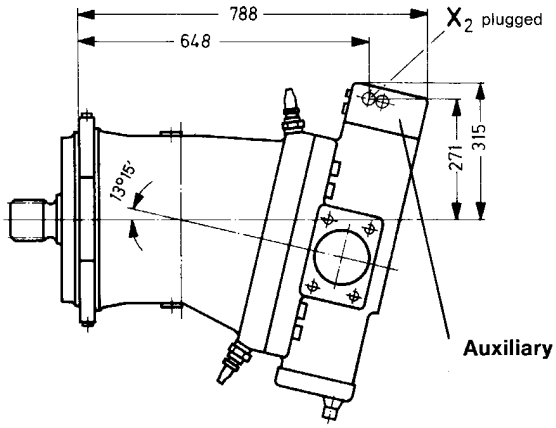


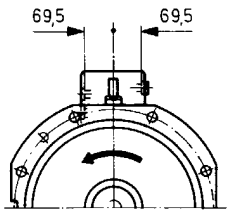
Model for Clockwise Rotation

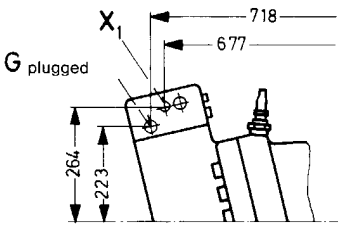










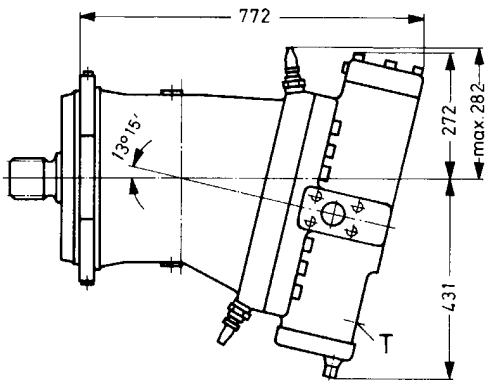


Auxiliary equipment: hydraulic stroke limiter (for LV)

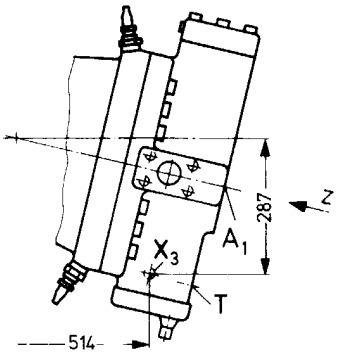
Weight, size 1000: approx. 520 kg

Constant Pressure Control DR

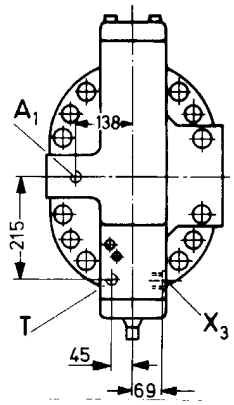
Standard Model



Remote Control

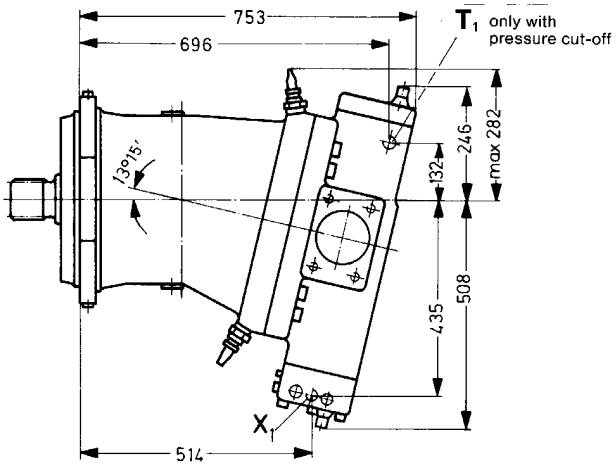


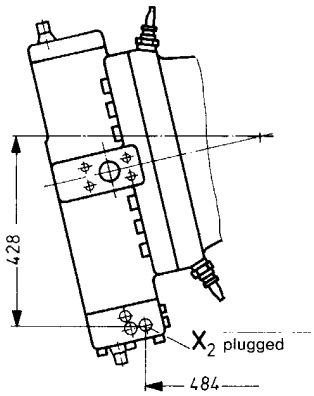
Detail Z



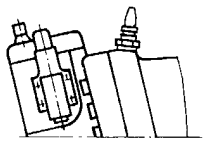
A_1 and X_3 only for remote control

Hydraulic Control, Pressure Related, HD





with Pressure Cut-Off



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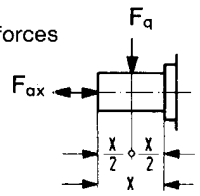
A_1,X_3	ports for remote control valve	M 22 x 1,5
T	pilot oil return line	M 16 x 1,5
T_1	pilot oil return line	M 22 x 1,5
R	air bleed	M 42 x 2 (plugged)
U	flushing port (for flushing of bearings)	M 18 x 1,5 (plugged)
M_1	gauge connection (operating pressure)	M 16 x 1,5 (plugged)

Drive

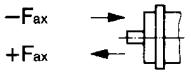
The drive shaft has bearings which allow axial and radial forces to be absorbed. Such forces arise from gear or belt drives, etc.

Application of forces



Permissible Axial Loads

The direction of axial force must be carefully noted.



The values for $+F_{ax}$ given below have no significant influence on the service life.

Permissible axial force at operating pressure p = 1 bar abs.

Size	250	355	500	1000
Axial force – F_{ax} (N)	1600	2000	2500	4000
Axial force + F_{ax} (N)	4000	5000	6250	10000

Permissible axial force at operating pressure p > 1 bar abs.

Size	250	355	500	1000
Axial force + F_{ax} (N)	4000	5000	6250	10000
Constants K_1 (N/bar)	90	115	140	220

A negative axial force – F_{ax} is permissible, depending on operating pressure.

$$-F_{ax\ perm.} = -F_{ax} + K_1 \cdot p\ (N)$$

K_1 = constant $(\frac{N}{bar})$

p = operating pressure (bar)

Permissible Radial Loads

At operating pressure p = 1 bar abs.

The radial load applied at the centre of the shaft length when the pump is stationary, or when it is rotating at zero pressure, may not exceed the value F_q.

At operating pressures p > 1 bar abs.

As the operating pressure is increased, higher radial forces are permissible on the drive shaft.

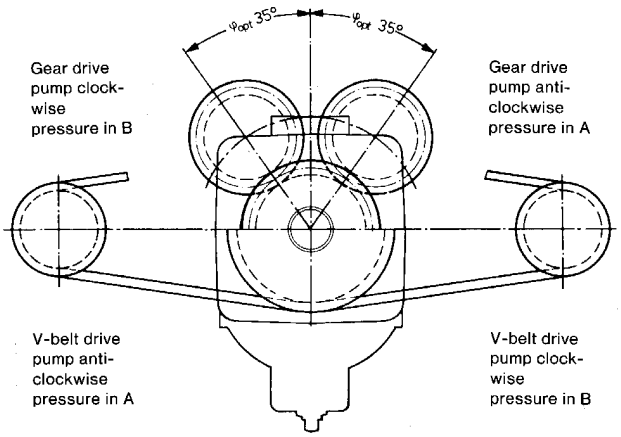
a) Gear drive (gear pressure angle to DIN 867)
For direct gear drive, the values are given for a minimum pitch circle diameter $D_{R\ min}$, which are correct for forces in the centre of the drive shaft.

b) V-belt drive (narrow series to DIN 7753).
The table shows the minimum permissible V-belt pulley diameters $D_{K\ min}$, for forces applied to the centre of the drive shaft. Belt pre-tension should not exceed the value F_q.

Size	250	355	500	1000
F_q (N)	2800	3500	4400	7000
$D_{R\ min}$ (mm) [1]	300	360	420	540
$D_{K\ min}$ (mm) [1]	380	450	520	680

[1] These will ensure that the service life of the units is not reduced, regardless of angle of application of radial force.

c) Optimum direction of operation of the radial force



Provided that the optimum direction of operation of the radial force F_{q0} is maintained, the following values apply:

Size	250	355	500	1000
F_{q0} (N)	4000	5000	6300	10000
$D_{R0\ min}$ (mm)	150	180	210	270
$D_{K0\ min}$ (mm)	250	300	350	450